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The relationship between the Big Five personality factors, Anger-Hostility and alcohol and violence in men and women: A nationally representative cohort of 15,701 young adults

Keywords

Neuroticism, Agreeableness, Anger, Hostility, Extraversion, Five Factor Model, Alcohol, Aggression, Violence, Personality

ABSTRACT

Aims

Alcohol consumption is known to have a disinhibiting effect, and is associated with a higher likelihood of aggressive behaviour, especially among men. People with certain personality traits maybe more likely to behave aggressively when intoxicated, and there may also be variation by gender. We aimed to investigate whether the reason why men and women with certain personality traits are more likely to engage in violence may be because of their alcohol use.

Method

The Big Five personality traits and Anger-Hostility, alcohol consumption and violence were measured by questionnaire in 15,701 nationally representative participants in the USA. We tested the extent to which alcohol mediates the relationship between personality factors and violence in men and women.

Results

Agreeableness was inversely associated with violence in both genders. Alcohol mediated approximately 11% of the effect in males, but there was no evidence of an effect in females. Anger-hostility was associated with violence in both sexes, but alcohol mediated the effect only in males. We also found that Extraversion was associated with violence and alcohol use in males and females. Alcohol accounted for 15% of the effect of extraversion on violence in males and 29% in females.

Conclusion

The mechanism by which personality traits relate to violence may be different in men and women. Agreeableness and anger-hostility underpin the relationship between alcohol and violence in men, but not in women. Reducing alcohol consumption in men with disagreeable and angry/hostile traits would have a small but significant effect in reducing violence, whereas in women, reducing alcohol consumption among the extraverted, would have a greater effect.

INTRODUCTION

A high proportion of violent crimes are carried out by people who are under the influence of alcohol at the time of the offence (CSEW, 2013), and general population surveys show a high proportion of people report a personal association between drinking alcohol and violence (R. M. Jones, Van Den Bree, Zammit, & Taylor, 2020; Wells, Graham, Speechley, & Koval, 2006). In addition, evidence from laboratory studies support a direct temporal effect of alcohol on aggression (Exum, 2006). There is also evidence that the relationship between alcohol consumption and aggression varies by personality characteristics, in a theory known as the

“conditional/interactive” theory (Pernanen, 1981). Alcohol is thought to increase aggression by overriding usual mechanism of inhibition (e.g. (Ito, Miller, & Pollock, 1996)), and personality

characteristics such as impulsivity have been shown to reduce behavioural control, contributing to alcohol use disorders (Gunn, Finn, Endres, Gerst, & Spinola, 2013) and aggression (Stevens, Blanchard, & Littlefield, 2018). It is therefore important to understand the mediating role of alcohol in relation to personality characteristics and aggression.

People with higher levels of dispositional aggression have been shown in experimental settings to be more aggressive when intoxicated than those with lower levels of dispositional aggression, (Bailey & Taylor, 1991; Giancola, 2002a; C. A. Miller, Parrott, & Giancola, 2009; Moeller, Dougherty, Lane, Steinberg, & Cherek, 1998; Parrott & Zeichner, 2002), and similar findings have been found among those with higher baseline irritability (Giancola, 2002b), those who have a baseline tendency to ruminate about revenge for perceived provocation (Borders & Giancola, 2011), and those who have poor anger control (Parrott & Giancola, 2004).

Personality characteristics have also been shown to influence drinking behaviour and motives for drinking (Mezquita, Stewart, & Ruipérez, 2010).

The five-factor model of personality ("big five") has proved to be a robust and highly replicated model of the structure of personality (P. T. J. Costa & McCrae, 1992; S. E. Jones, Miller, & Lynam, 2011; O'Connor, 2002), and has become the most prominent model for research (e.g. (Donnellan, Oswald, Baird, & Lucas, 2006; Funder, 2001)). The five factor model comprises "Extraversion/Introversion" (gregariousness, activity, social adaptivity and assertiveness at one end of the spectrum, and being reserved, having less need of stimulation at the other end); "Agreeableness"

(altruism, nurturing, conformity, and likeability and caring at one end, and hostility, self-centeredness, spitefulness and jealousy at the other); "Conscientiousness"

(dependability, will to achieve, and responsibility and self-control on one end, and impulsivity, poor self-control and lack of will to achieve on the other); "Neuroticism" (instability of affect and irritability on one end, calm and emotionally stable on the other end); and "Openness to Experience" (intellectual curiosity, awareness of inner feelings, openness to new ideas and intellectual flexibility on one end of the spectrum, and preference for familiarity, resistance to change and a closed thinking style on the other).

An inverse association between agreeableness and aggression/violence is strongly and consistently reported (Barlett & Anderson, 2012; Gleason, Jensen-Campbell, & South Richardson, 2004; Heaven, 1996; C. A. Miller et al., 2009; Tremblay & Ewart, 2005). A meta-analysis of 15 studies, with a combined number of over 4,500 participants, found a strong inverse relationships between antisocial behaviour and agreeableness (J. D. Miller & Lynam, 2001). Neuroticism is also associated with aggressive behaviour (Sharp & Desai, 2001; Tremblay & Ewart, 2005) and aggressive emotions (Barlett & Anderson, 2012). The mechanism of the relationship between agreeableness and violence is thought to be different to the mechanism of the relationship between Neuroticism and violence in that low agreeableness is thought to operate through instrumental or callous hostility, whereas neuroticism is thought to operate through defensive and emotional reactions (Egan, 2009). Anger is not one of the five primary personality traits, but is strongly correlated with neuroticism and may be considered a facet of neuroticism within the five factor model (P. T. Costa, Jr. & McCrae, 1995; Sharp & Desai, 2001; Tremblay & Ewart, 2005). Anger is associated with aggression, as demonstrated in both clinical (Reagu, Jones, Kumari, & Taylor, 2013) and non-clinical studies (Berkowitz, 2001; Scarpa & Raine, 1997). Trait anger is defined as the dispositional tendency to experience a wide range of

situations as annoying or frustrating, and to have a tendency to respond frequently with elevations in intensity of anger.

As well as being associated with violence, agreeableness, and neuroticism are both particularly associated with alcohol use. A meta-analysis of 20 studies showed that overall, alcohol use was associated with low agreeableness and high neuroticism

(Malouff, Thorsteinsson, Rooke, & Schutte, 2007).

The relationship between personality, alcohol and aggression is likely to be influenced by gender. Women report higher levels of both agreeableness and neuroticism than men (Schmitt, Realo, Voracek, & Allik, 2008), but also tend to be less violent, and consume less alcohol. Moreover, a review of the experimental literature found a significant effect of alcohol on aggression in women (Crane, Licata, Schlauch, Testa, & Easton, 2017), which was weaker than the observed effect in men (Crane, Godleski, Przybyla, Schlauch, & Testa, 2016), due to the higher levels of dispositional aggression in the latter group (Crane et al., 2017).

There is evidence therefore that both the propensity to drink alcohol and to be aggressive are underpinned by common aetiological factors (Dembo et al., 1992; Donovan & Jessor, 1985; McGee & Newcomb, 1992; White, Brick, & Hansell, 1993) (Kendler, Prescott, Myers, & Neale, 2003; Krueger, Markon, Patrick, Benning, & Kramer, 2007), which may include a dispositional propensity for behavioural disinhibition and lack of self-control (Iacono, Carlson, Taylor, Elkins, & McGue, 1999). There is also evidence that alcohol directly increases aggression, and may do so disproportionately among individuals who have particular personality traits; however, it is not clear to what extent alcohol may mediate the relationship between these personality traits and violence. We are not aware of any study that has investigated the relationship between personality dimensions, alcohol and violence in a community setting. The purpose of this study was to model the relationship between each of the five personality factors, as well as anger-hostility, and alcohol and violence in a large nationally representative sample. Based on prior literature as reviewed above, we aimed to test the hypothesis that agreeableness, neuroticism, and anger-hostility, but not other personality traits, are associated with violence both in men and women, and that these relationships are mediated by alcohol use.

METHODS

Participants and procedures

This study is based on 15,701 men and women who participated in the National Longitudinal Study of Adolescent Health (Add Health). Add Health is a prospective cohort study of nationally representative adolescents in the USA which commenced in 1994-95. Data for this study were collected during Wave IV, in 2008 when the participants were between 24-32 years of age, and is the latest full sample dataset to be released for analysis (See (Harris, 1995) for further details about the design of the study).

Measures

All information was gathered using audio-computer assisted self interview (ACASI) using laptop computers. This technology has been found to improve the quality of self-reporting sensitive information (Turner, Ku, Lindberg, Pleck, & Sonenstein, 1998).

Personality traits

Personality traits were assessed using the Mini-IPIP (Donnellan et al., 2006), a questionnaire designed to measure the “Big-Five” personality traits (extraversion, neuroticism, agreeableness, openness and conscientiousness). The Mini-IPIP was developed as a shorter (20-item) form of the International Personality Item Pool Five-Factor Model Measure (Goldberg, 1999). Participants were asked to rate each statement about themselves on a 5-point Likert scale (“strongly agree” to “strongly disagree”). Each personality factor was measured by 4 items (see Table 1).

An anger-hostility-aggression scale also containing 4 items was derived from items within the anger facet of the NEO PI-R (P. T. J. Costa & McCrae, 1992), which is a 240-item questionnaire measuring the personality traits of the Five Factor Model. Applied to data used in the current study, the Anger-hostility score was found to correlate highly with neuroticism (0.69), but not with the other traits (-0.12 to -0.16). Anger-hostility is considered to be a “facet” or sub-component of neuroticism (P. T. Costa, Jr. & McCrae, 1995) and therefore the anger-hostility factor was defined as a second order factor indicated by the latent factor neuroticism and the 4 anger-hostility items.

Alcohol Use

Four questions were used to measure alcohol use over the 12 months prior to interview: frequency of drinking alcohol, frequency of binge drinking (drinking 5 or more drinks in a row), frequency of intoxication with alcohol, and the number of drinks usually consumed on each drinking occasion. The first three items were each measured on a 7-point scale (“never”, “1-2 days in past 12 months”, “3-12 days in past 12 months”, “2-3 days per month”, “1-2 days a week”, “3-5 days a week”, to “every/almost every day”). For the fourth question, respondents were required to report the number of drinks usually consumed as an integer (see Table 1).

Violence

Violence was measured by four questions about frequency of different forms of violence over the 12 months prior to interview: Frequency of fighting, frequency of seriously hurting someone in a fight, frequency of fighting in a group against another group each measured on a 4-point scale (“never”, “1-2 times”, “3-4 times and “5 or more times”), and whether they had “pulled a knife or gun on someone” measured on a binary scale.

Data analysis

Age was considered to be continuous and normally distributed. All other manifest variables were defined as ordered categorical. Univariate descriptive statistics were generated on the study population using Stata version 12. Mplus version 7 was used for structural equation modelling in a two-step process. First, confirmatory factor analyses (CFA) were carried out on the entire sample to determine the adequacy of the factor loadings, model fit, and correlations of the latent factors. A confirmatory factor analysis was carried out to determine whether each of the variables loaded onto their respective latent constructs. All of the factors (extraversion, agreeableness, conscientiousness, neuroticism, openness, anger-hostility, alcohol and violence) were each measured by 4 variables. In the initial analysis, all variable loadings were allowed to vary freely except for the first measure of each factor which was constrained at 1.0 to identify the metric of the latent variable. All factor intercorrelations were freed, as were the error terms within the same measure.

Second, structural models were tested on the sample divided by gender, to evaluate the total, direct and indirect relationships between alcohol, violence and personality traits using age in years as a covariate. We used WLSMV parameter estimation to correct for multivariate non-normality. Mplus allows multivariate modelling using all available data account for missing data, which was employed

in the current study. Bootstrapping with 1000 draws was used to calculate confidence intervals of the standardised path estimates. Model fit was evaluated using the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), Weighted Root Mean Square Residual (WRMR), and chi squared test of model fit. Accepted fit criteria are CFI and TLI >0.95, RMSEA<0.06-0.08, and a non-significant chi-squared test.

RESULTS

Descriptive Statistics

The analyses were conducted on all 15,701 participants, of whom 7,353 (46.8%) were male. The mean age of the participants was 29.0 years (SD 1.75). The median and inter-quartile range of each personality item is shown in Table 1, and shows similar scores among males and females.

In total 1,214 (7.7%, 95% CI 7.3-8.2) engaged in at least one violent act in the past 12 months. A higher proportion of males (11.9%, 95%CI 11.1-12.2) engaged in violence than females (4.1%, 95%CI 3.7-4.6) ($\chi^2 = 330.4$, $p < 0.001$). 75% of males and 68% of females drank alcohol at least once in the year prior to interview ($\chi^2 = 110$, $p < 0.001$). The mean number of drinks consumed each occasion for men was 3.3 (SD=3.4), and for women was 2.4 (SD=2.4, $t = 27.1$, $p < 0.001$). Fifty-five per cent of males and 40% of females engaged in binge drinking at least once over the year prior to interview

($\chi^2 = 349$, $p < 0.001$), and similar proportions reported getting drunk at least once (56% of males compared with 40% of females, $\chi^2 = 389$, $p < 0.001$). Confirmatory Factor Analysis

The initial model did not fit the data very well (CFI=0.91, TLI=0.90, RMSEA=0.058, WRMR=6.21, $\chi^2 = 23747$, $p < 0.001$). Model fit was improved by specifying correlations between personality variables guided by the model fit indices. The resulting model fitted the data reasonably well (CFI=0.95; TLI=0.94; RMSEA=0.044, 95% CI = 0.043-0.044, $p < 0.05$; WRMR=4.61; $\chi^2 = 13,043$, $p < 0.001$). A significant χ^2 was expected as the test is sensitive to sample size. Without further modification, the confirmatory factor analyses were run separately for males and females with almost identical model fit in each case. The standardised factor loadings for each variable are shown in Table 1 and shows acceptable loadings onto respective factors.

Structural models

Model fit indices for the model which included only men were as follows: CFI=0.95, TLI=0.95, RMSEA=0.043 (95% CI 0.042-0.044, $p < 0.05$), WRMR=3.21, $\chi^2 = 6,565$, $p < 0.001$), and for the model including only women were (CFI=0.96, TLI=0.95, RMSEA=0.038 (95% CI 0.037-0.039, $p < 0.05$, WRMR=3.07, $\chi^2 = 5,849$, $p < 0.001$).

Association between personality factors and alcohol consumption

We found that extraversion was significantly associated with alcohol consumption in both males and females (standardised coefficient 0.24 and 0.25 respectively). Openness was also associated with alcohol consumption in both males and females (standardised coefficient 0.14 and 0.12 respectively), and there was a small but significant association between conscientiousness and alcohol, which was relatively smaller for males (-0.04) than for females (-0.11). We found a significant association between neuroticism and alcohol consumption in males (-0.35), but no association in females. We also found a significant association between (dis)agreeableness and alcohol consumption, in males (-0.16) but not in females (see Table 2).

Mediating effects of alcohol on aggression

We found that in both males and females, alcohol was positively associated with violence (standardised estimate of 0.13 and 0.19 respectively, see Table 3). With regard to personality factors, Extraversion was positively associated with violence; the total standardised effect for males and females was 0.19 and 0.17 respectively. Figures 1 and 2 show a representation of the model for males and females respectively (only paths with effect sizes $p < 0.05$ are shown). As shown in Table 3, among males, approximately 16% of the effect of extraversion on violence was an indirect effect mediated by alcohol, and among females, alcohol mediated approximately 29% of the effect.

Agreeableness was inversely associated with violence to a similar magnitude in both males and females (standardised estimate of -0.18). In males there was a significant indirect effect of agreeableness on violence mediated by alcohol, amounting to approximately 11% of the total effect, whereas in females, there was no evidence that the effect of Agreeableness on violence was mediated by alcohol.

Neuroticism was inversely associated with alcohol use in males but not in females; it was not associated with violence in either sex. There was, however, strong evidence of an overall effect of anger-hostility on violence in both sexes, with the effect higher in females (standardised estimates of 0.27 and 0.37 for males and females respectively). There was no evidence of significant indirect effects of anger-hostility on violence in females, but in males, approximately 20% of the total effect was mediated by alcohol.

With regard to the other personality traits, openness was associated with violence in males (total standardised effect 0.14); approximately 14% of the total effect was mediated by alcohol. Openness was not associated with violence in females. Conscientiousness was inversely related to alcohol in both sexes, but was not associated with violence.

We found that the proportion of the variance of violence explained by the model (R^2) was 15.2% and 22% in the models including only males or female respectively. The corresponding variances of alcohol explained by the model were 8.5% and 10.8% respectively

Alternative models

Theory would suggest that personality factors underpin alcohol use and aggression; however, alternative structural models were tested in which personality factors were specified as mediating the relationship between alcohol and violence (using the same correlations specified as in the previous model). Model fit was poorer than that for the primary models tested (CFI=0.89, TLI=0.88, RMSEA=0.065 (95% CI 0.064-0.066), WRMR=5.29, $\chi^2=14,691$, $p < 0.001$) for males, and for females CFI=0.86, TLI=0.83, RMSEA=0.069 (95% CI 0.068-0.070), WRMR=6.09, $\chi^2=18,771$, $p < 0.001$.

DISCUSSION

In a nationally representative sample of over 15,700 people, we investigated the extent to which the Big Five personality factors were associated with violence, and whether alcohol may mediate relationships between personality factors and violence. Our study provides confirmation that alcohol consumption and aggression varies by personality characteristics, suggested in part by the “conditional/interactive” theory (Pernanen, 1981). We confirmed our hypotheses that low agreeableness was associated with alcohol consumption in men and women; however, we found that alcohol mediated the relationship in men but not in women. Consistent with previous findings, we found that low agreeableness was significantly associated with violence among women. Women are generally found to score higher on measures of agreeableness than men, and have fewer alcohol problems which may explain the focus on males in previous research and typologies of alcoholism.

As few studies have investigated males and females separately, a new finding from our study is that the relationship between agreeableness and violence is similar in both men and women, but there are differences in the extent to which alcohol mediates this relationship. In men, alcohol accounted for around 14% of the relationship between agreeableness and violence, whereas in women, there was no evidence of a mediating effect of alcohol.

We found a significant association between anger-hostility and violence, in both men and women. Although there appeared to be a larger effect of anger-hostility on violence in women than men, there was no evidence of alcohol mediating this effect in women. In contrast, in men there was evidence that a significant part of the effect (approximately 19% of the total effect of anger-hostility on violence) was mediated by alcohol. A potential practical implication of this finding is that reduction of alcohol consumption in people with disagreeable and angry/hostile traits would have a small but significant effect in reducing violence in men, but not in women.

Although previous studies have shown that neuroticism is associated with violence, our findings suggest that anger-hostility may be the key component in this relationship. With the exception of impulsivity, the other facets of neuroticism

(anxiety, self-consciousness, depression and vulnerability), are not generally thought as contributory factors to violence. This suggests that the facets which are clustered within each personality factor may not act equally, or indeed even in the same direction in causing behaviours, and therefore a more detailed understanding of relationships between personality, violence and alcohol may be achieved by investigating relationships at the level of the facet in addition to the core personality factors.

With regard to the other personality factors, we found evidence that both extraversion and openness were associated with violence. Previous findings as to the relationship between extraversion and aggression are mixed. Jung described the extravert as someone who had a tendency to action rather than thought, and there is some face validity to the notion that such individuals may be more likely to act aggressively. Eysenck believed that extraversion was higher in offenders than non-offenders (Egan, 2009), however this view was revised when impulsivity and extraversion were considered to be independent of one another (impulsivity is considered to be a facet of neuroticism in current five factor models of personality (P. T. J. Costa & McCrae, 1992)). Although some studies have shown an association between extraversion and aggression, for example in males who engage in intimate partner violence (Fechter & Snell, 2002), the majority of studies to date have shown no relationship with aggression e.g. (Sharp & Desai, 2001). In our study, alcohol accounted for a substantial part of the relationship between extraversion and violence in both men and women, and this may explain variation in results in studies which do not control for the effect of alcohol. Extraversion has been consistently shown to be associated with alcohol use and misuse in general population samples, (Cooper, Agocha, & Sheldon, 2000; Malouff et al., 2007; Peterson & Morey, 2005) (Ruiz, Pincus, & Dickinson, 2003; Stewart, Loughlin, & Rhyno, 2001; Vollrath & Torgersen, 2002), although not in samples drawn from those with alcohol use disorder or psychiatric diagnoses

((Malouff et al., 2007; Martin & Sher, 1994; Trull & Sher, 1994). It is likely that extraverted individuals are more likely to socialise, and in western societies, socialise in places where alcohol is consumed, and therefore exposure to situations where violence might be precipitated is more likely.

We found that openness was associated with violence in males, but not females, but was associated with alcohol in both sexes. A previous study found a positive relationship between a measure of physical aggression and openness, but not between self-reports of violent behaviour and openness (Barlett & Anderson, 2012). Other studies have shown no relationship between openness and aggression (Barlett & Anderson, 2012; Gleason et al., 2004; Sharp & Desai, 2001), or with alcohol use or alcohol use disorders (Ibanez et al., 2010; Lackner, Unterrainer, & Neubauer, 2013; Malouff et al., 2007; Ruiz et al., 2003). Differences may have arisen due to differences in the measures of aggression and violence, and whether the effect of alcohol was controlled for. It is not immediately apparent why individuals who report higher levels of imagination and interest in abstract ideas are also more likely to report violence, and further studies are required to investigate this relationship.

We found a negative relationship between conscientiousness and alcohol. This is consistent with previous studies that have found a negative relationships with both alcohol use and misuse and conscientiousness (Ibanez et al., 2010; Kashdan, Vetter, & Collins, 2005; Malouff et al., 2007; Martin & Sher, 1994; Trull & Sher, 1994). Previous studies have found either a negative association with aggression (Sharp & Desai, 2001; Tremblay & Ewart, 2005) or no relationship with aggression (Barlett & Anderson, 2012). We found a small association with violence, but 40% of the total effect was mediated by alcohol, again highlighting the importance of taking into account the effect of alcohol in the relationship between personality traits and violence.

There were a number of limitations to our study. Firstly, the measure used for measuring personality traits was a brief questionnaire. Each trait was measured by only four items, and a more comprehensive questionnaire would likely have given a more reliable measure. Nevertheless, the instrument has been shown to be a valid and reliable measure (Donnellan et al., 2006), with acceptable psychometric properties (Baldasaro, Shanahan, & Bauer, 2013), and in addition, our confirmatory factor analyses carried out in this study showed adequate model fit for the 5-factor personality structure using these items. Second, anger-hostility is thought to be a facet of neuroticism within the five-factor model, and was defined in our model as comprising indicators of both neuroticism and anger-hostility. We specified our model with indirect effects of anger-hostility via neuroticism in order to try to parse out neuroticism from anger-hostility, hence we may not have been able to fully distinguish between neuroticism generally and anger-hostility more specifically. Third, all measures were based on self-report. Audio-computer assisted self interview (ACASI) on laptop computers was used for sensitive health and health risk behaviour questions in all waves. Although this technology has been found to improve the quality of self-reporting sensitive information (Turner et al., 1998), reliability may have been improved by the availability of information from multiple sources. Fourth, although the effect sizes give an indication of the direction and relative magnitudes of the effects of personality traits on violence, their magnitudes are difficult to translate to clinical meaning when the units are in standard deviations and the measures are factor scores. In addition, some of the effect sizes, although statistically significant were very small, and would be unlikely to have any clinical importance. Nevertheless, the novel aim of the study was to investigate the relative effects of alcohol on personality factors and violence, and further studies are required to investigate the extent to which interventions can bring about changes in the pathways from personality to violence. Fifth, although the model showed adequate statistical fit of the data, alternative models are possible that may fit the data equally well or better. Our primary model was guided by theory and provided the best model fit. Although we tested an alternative model which was theoretically possible (which did not fit the data as well) other models are possible. In addition, the data were cross-sectional, and therefore the direction of association as specified in our models provides the best statistical fit of the data, but does not allow us to be certain about direction of effects. Furthermore, there may be confounding of the relationships. We

controlled for the effect of age, and analysed separately by gender but other confounders for which we did not control may be present.

A strength of this study is that data were drawn from a large, nationally representative cohort, including individuals from diverse groups of society, nationally representative of ethnicity, socio-economic status and gender, and were able to draw on multiple measures of each variable. To our knowledge, this is the first study to investigate the relationship between personality factors, alcohol and violence in a community setting.

Violence results in multiple adverse consequences for victims, perpetrators and society, and there is a strong need to understand more about the aetiological mechanisms in order to try to prevent it. Several public health measures are currently used to reduce violence such as targeted policing, alcohol education and licensing, and there is evidence that violence is decreasing in many societies e.g. (Chaplin, Flatley, & Smith, 2011; Lauritzen & Rezey, 2013). Targeted interventions based on personality type, gender and alcohol consumption could further reduce the rates of violence.

Further research into the relationship between personality, alcohol and violence is needed and should include measures of the facets of personality as well as the core personality factors to investigate how they relate to both alcohol and violence, and whether they are amenable to intervention

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Table 1. Items used to indicate latent factors. Median and interquartile ranges, and standardized factor loadings

Variable	Median (IQR range)	Males		Females	
		Median (IQR range)	Standardized factor loadings	Median (IQR range)	Standardized factor loadings
Extraversion					
Life of the party*	3(3-4)	0.43		3(3-4)	0.42
Don't talk a lot	2(2-4)	0.41		4(3-4)	0.43
Talk to a lot of different people at parties*	4(2-4)	0.80		4(2-4)	0.69
Keep in the background	3(2-4)	0.87		4(3-4)	0.80
Agreeableness					
Sympathize with others' feelings*	4(4-4)	0.46		4(4-5)	0.45
Not interested in other's problems	4(3-4)	0.65		4(3-4)	0.64
Feel other's emotions*	4(3-4)	0.52		4(3-4)	0.65
Not really interested in others	4(3-4)	0.90		4(4-4)	0.92
Conscientiousness					
Gets chores done right away*	4(3-4)	0.26		4(3-4)	0.35
Often forgets to put things back in their proper place	4(2-4)	0.53		4(3-4)	0.54
Lives order*	4(2-4)	0.32		4(4-4)	0.38
Make a mess of things	4(3-4)	0.98		4(4-4)	0.95
Neuroticism					
Frequent mood swings*	2(2-3)	0.63		3(2-4)	0.66
Relaxed most of the time	2(2-3)	0.41		2(2-3)	0.45
Get upset easily*	2(2-3)	0.88		2(2-3)	0.85
Seldom feels blue	2(2-4)	0.28		3(2-4)	0.29
Angry-Hostility					
Gets angry easily*	2(2-3)	0.85		2(2-3)	0.87
Rarely gets irritated	3(2-4)	0.56		3(2-4)	0.53
Lower temper*	2(2-3)	0.83		2(2-3)	0.66
Keeps cool	2(2-3)	0.73		2(2-3)	0.80
Neuroticism		0.96			0.92
Openness					
Has a vivid imagination*	4(3-4)	0.42		4(3-4)	0.40
Not interested in abstract ideas	3(3-4)	0.58		3(3-4)	0.53
Has difficulty understanding abstract ideas	4(3-4)	0.62		4(3-4)	0.48
Does not have a good imagination	4(4-5)	0.88		4(4-4)	0.64
Violence					
How often in a serious physical fight	0 (0-0)	0.89		0 (0-0)	0.93
How often in a fight where a group of your friends was against another group?	0 (0-0)	0.62		0 (0-0)	0.65
How often hurt someone badly enough to need bandages or care from a doctor or nurse?	0 (0-0)	0.85		0 (0-0)	0.98
How often pulled a knife or gun on someone?	0 (0-0)	0.50		0 (0-0)	0.37
Alcohol					
Frequency of drinking alcohol	3(1-4)	0.79		2(0-3)	0.82
Number of drinks usually consumed	3(1-5)	0.66		2(0-3)	0.83
How many days drink: drink 5 or more drinks in a row	1(2-3)	0.89		0(0-1)	0.87

Table 2. Unstandardized and standardized coefficients of personality factors associated with alcohol for males and females.

	Alcohol					
	Males			Females		
	Unst	SE	Stand	Unst	SE	Stand
Extraversion						
Direct effect	0.92**	0.06	0.24	0.83**	0.07	0.25
Agreeableness						
Direct effect	-0.53**	0.06	-0.16	-0.12	0.07	-0.04
Conscientiousness						
Direct effect	-0.23*	0.09	-0.04	-0.42**	0.09	-0.11
Neuroticism						
Direct effect	-0.64*	0.40	-0.35	-0.05	0.35	-0.02
Anger-Hostility						
Direct effects	0.21	0.41	0.40	0.21	0.16	0.09
Openness						
Direct effects	1.88*	0.89	0.14	0.41**	0.09	0.12

Unst., Unstandardized; SE, Standard Error; Stand, Standardized; CI, Confidence Interval.
*p<0.05, **p<0.01

Table 2. Unstandardised and standardised coefficients of personality factors associated with alcohol for males and females.

	Alcohol					
	Males			Females		
	Unst	SE	Stand	Unst	SE	Stand
Extraversion						
Direct effect	0.92**	0.06	0.24	0.83**	0.07	0.25
Agreeableness						
Direct effect	-0.83**	0.08	-0.16	-0.12	0.07	-0.04
Conscientiousness						
Direct effect	-0.23*	0.09	-0.04	-0.42**	0.09	-0.11
Neuroticism						
Direct effect	-0.04*	0.40	-0.35	-0.05	0.35	-0.02
Anger-Hostility						
Direct effects	0.21	0.41	0.40	0.21	0.16	0.09
Openness						
Direct effects	1.09*	0.06	0.14	0.41**	0.06	0.12

Unst, Unstandardised; SE, Standard Error; Stand, Standardised; CI, Confidence Interval.
* $p < 0.05$, ** $p < 0.01$

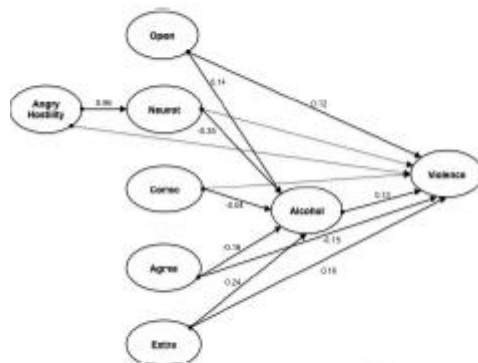
Table 3. Unstandardised and standardised coefficients of alcohol and personality factors associated with violence for males and females.

	Violence							
	Males				Females			
	Unst	SE	Stand	95% CI	Unst	SE	Stand	95% CI
Alcohol								
Direct effect	0.09**	0.02	0.13	0.05, 0.18	0.13**	0.02	0.19	0.14, 0.24
Extraversion								
Direct effect	0.39**	0.06	0.16	0.10, 0.22	0.30**	0.11	0.13	0.05, 0.20
Indirect via alcohol	0.08**	0.02	0.03	0.02, 0.04	0.11**	0.02	0.05	0.03, 0.06
Total effects	0.46**	0.06	0.19	0.14, 0.25	0.41**	0.11	0.17	0.10, 0.25
Agreeableness								
Direct effect	-0.32**	0.09	-0.15	-0.22, -0.09	-0.37**	0.13	-0.17	-0.27, -0.07
Indirect via alcohol	-0.05**	0.01	-0.02	-0.03, -0.01	-0.02	0.01	-0.01	-0.02, 0.00
Total effects	-0.37**	0.09	-0.18	-0.25, -0.11	-0.39**	0.13	-0.18	-0.26, -0.08
Conscientiousness								
Direct effect	-0.09	0.10	-0.03	-0.07, 0.02	-0.04	0.13	-0.02	-0.09, 0.06
Indirect via alcohol	-0.02*	0.01	-0.01	-0.01, -0.00	-0.06**	0.01	-0.02	-0.03, -0.02
Total effects	-0.11	0.04	-0.03	-0.08, 0.02	-0.10	0.14	-0.04	-0.11, 0.04
Neuroticism								
Direct effect	-0.20	0.35	-0.13	-0.51, 0.25	0.06	0.22	0.04	-0.20, 0.29
Indirect via alcohol	-0.07*	0.04	-0.05	-0.09, -0.01	-0.01	0.02	0.00	-0.03, 0.02
Total effects	-0.27	0.35	-0.18	-0.55, 0.20	0.05	0.23	0.04	-0.21, 0.28
Anger-Hostility								
Direct effect	0.51	0.35	0.39	0.01, 0.75	0.52*	0.25	0.33	0.07, 0.57
Indirect via alcohol	0.09*	0.04	0.05	0.02, 0.09	0.03	0.02	0.02	-0.01, 0.04
Indirect via Neuroticism	-0.20	0.35	-0.13	-0.49, 0.24	0.06	0.22	0.04	-0.19, 0.27
Indirect via Neuroticism and Alcohol	-0.07*	0.04	-0.05	-0.08, -0.01	-0.01	0.02	0.00	-0.02, 0.02
Total effects	0.43**	0.05	0.27	0.23, 0.32	0.61**	0.06	0.37	0.31, 0.43
Openness								
Direct effect	0.28**	0.10	0.12	0.05, 0.19	0.11	0.18	0.05	-0.05, 0.19
Indirect via alcohol	0.04**	0.01	0.02	0.01, 0.03	0.06**	0.02	0.02	0.01, 0.03
Total effects	0.32**	0.10	0.14	0.07, 0.21	0.17	0.18	0.07	-0.05, 0.21

Unst, Unstandardised; SE, Standard Error; Stand, Standardised; CI, Confidence Interval.
* $p < 0.05$, ** $p < 0.01$

Fig1

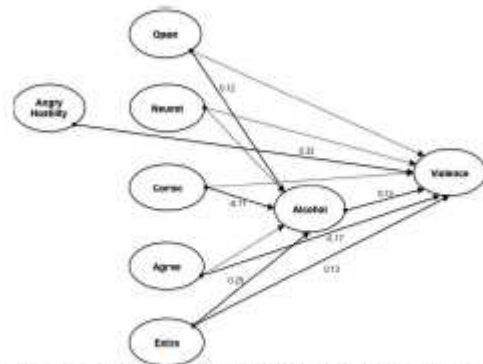
Final model of standardised effects of personality factors on alcohol and violence for men.



Only effect sizes $p < 0.05$ are shown. Correlations between latent factors are not shown.

Fig2

Final model of standardised effects of personality factors on alcohol and violence for women.



Only effect sizes $p < 0.05$ are shown. Correlations between latent factors are not shown.